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1990 ANNUAL REPORT

Georgia Department of Natural Resources

Georgia Department of Natural Resources

A Message From the Commissioner



Dear Georgians:

Ours is a state of limitless opportunity and diverse natural beauty. As the final decade of this century begins, the state's citizens are perhaps more mindful than ever that the quality of life enjoyed in Georgia is largely dependent on the exceptional and abundant natural resources found here.

Under the leadership of Governor Joe Frank Harris, the Department of Natural Resources has emphasized the effective conservation of these resources as crucial not only to continued economic prosperity, but also to the well being of every community and individual. During fiscal year 1990, this emphasis resulted in many remarkable achievements.

The Department maintained as its number-one priority the elimination of all toxic chemicals from the environment and made substantial gains toward this multi-faceted, complex goal. As the \$30-million Wildlife Lands Acquisition program administered through the Game and Fish Division ended its second year, 59,971 acres of new public hunting and fishing lands had been added to the state, giving Georgia sportsmen access to high quality outdoor recreation. A comprehensive program to upgrade the quality of all State Parks and Historic Sites, and increase recreational opportunities, resulted in new attractions for the public. Meanwhile, state parks drew another record number of visitors, and continued playing a major role in developing Georgia's growing tourism industry. Coastal Resources programs were stepped up to further enhance the uniquely valuable resources of the coast. Special programs progressed toward developing reliable, longterm water supplies; protecting freshwater wetlands and natural communities; and restoring endangered or threatened species of wildlife.

On behalf of the Board of Natural Resources, and DNR's staff, I am pleased to present this Annual Report of progress made through a host of programs that will help shape the best future possible for Georgia. To the Governor, members of the General Assembly, various citizen/conservation groups and the public, please accept my sincere appreciation for your continuing support of the Department's efforts to protect, manage and improve Georgia's irreplaceable natural, environmental and cultural resources.

Sincerely,

A handwritten signature in black ink, appearing to read "Joe D. Tanner". The signature is fluid and cursive, with a large initial "J" and a long, sweeping underline.

Joe D. Tanner

Commissioner

Georgia Department of Natural Resources



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Introduction

*The Georgia Department of Natural Resources (DNR) was organized as an agency of state government in 1972. The Department is governed by a 15-member Board, appointed by the Governor and approved by the state Senate, to serve staggered, seven-year terms. A Board-appointed Commissioner is the Department's Chief Executive. Major operating Divisions include **Environmental Protection; Game and Fish; Parks, Recreation and Historic Sites; and Coastal Resources.** Other special programs, administered through the Commissioner's Office, include **Georgia's Nongame Wildlife Program and Habitat Acquisition Fund; the Freshwater Wetlands and Heritage Inventory Program; and the Regional Reservoirs Program.***

*The Department's **Vision** is to guide and promote the wise use of the state's rich and abundant natural, environmental, historic, archaeological and recreational resources, for present and future generations. The Department's ongoing **Mission** is to carry out programs set forth in a **Five-Year Strategy for Managing Natural and Environmental Resources.***

As fiscal year 1990 came to a close, the Georgia Department of Natural Resources (DNR) made progress in implementing some of the most comprehensive environmental planning laws and programs ever undertaken in Georgia. The Department increased the number of toxics controlled in water by more than ten-fold; initiated a milestone study on the ozone problem in metro Atlanta; and began enforcement of the state's new **Comprehensive Solid Waste Management Act**, which gives communities decisive guidelines for solving their solid waste disposal problems. As populations and land-use changes continued to impact wildlife, natural areas and the fragile ecology of the coast, DNR upgraded and broadened the scope of outdoor recreation opportunities, and continued enhancement of coastal resources. These accomplishments gave Georgians new opportunities for enjoyment at state parks and historic sites, new lands for public hunting and fishing, and improved recreational and commercial fisheries on the coast.

Through special programs, DNR implemented planning efforts for the West Georgia Regional Reservoir, as authorized by the **1989 Water Supply Act**; started up the new wetlands mapping project as funded by the **1989 Growth Strategies Planning Act**; and successfully launched the state's first income tax checkoff, which raised over \$300,000 to benefit nongame



wildlife. The Department's Personnel Office developed plans to enhance employee career development and to increase the participation of minorities and women in management roles throughout DNR; and the **Change Management Employee Seminar** training for DNR personnel, conducted statewide, was completed.

During the fiscal year, the Board of Natural Resources approved the following **Five-Year Strategy** goals for the effective protection and management of Georgia's natural, environmental and cultural resources in the coming year:

- Reduction or elimination of any source of chemicals in the environment to levels below established standards for air, surface water, groundwater and community water systems, and solid waste management facilities.
- Operate, maintain and protect the natural and cultural resources of state parks, historic sites and natural areas at maximum efficiency commensurate with available funding, to meet guest demands for general and outdoor recreation.
- Meet public needs for wildlife oriented recreation by staffing, developing and managing new wildlife management areas, public fishing areas and MARSH projects to include resource protection, recreation, natural areas, archaeology and endangered species.
- Manage Georgia's marine fisheries and coastal marshlands/estuaries consistent with

existing laws and sound biological principles.

- Provide career enhancement and staff development opportunities for all DNR employees, especially minorities and women, to assure fairness in filling positions including management positions.
- Provide various data bases to local governments, Regional Development Centers and other agencies to improve statewide programs for effective land-use planning as authorized in the Comprehensive Planning Act.
- Administer an effective state historic preservation program according to the goals of the State Historic Preservation Plan, including implementation of the Georgia Register of Historic Places.

As the Department seeks to achieve these goals with the leadership provided by the Governor and with the support of the General Assembly and the public, Georgia communities will be able to meet the challenges presented by robust growth, and while planning, take the steps necessary to conserve natural resources. DNR remains committed to helping communities shape an excellent future for their own regions, and for the entire state.

DNR Special Programs

REGIONAL WATER SUPPLY RESERVOIRS PROGRAM

The 1989 amendments to the **Georgia Water Supply Act** recognized that meeting drinking water needs for the state's growing population depends on the development of large-capacity, multi-jurisdictional **regional water supply reservoirs**.⁽¹⁾ The Act authorized DNR, during fiscal 1990, to begin studies toward developing needed regional reservoirs in a 44-county service area in north and north-central Georgia.

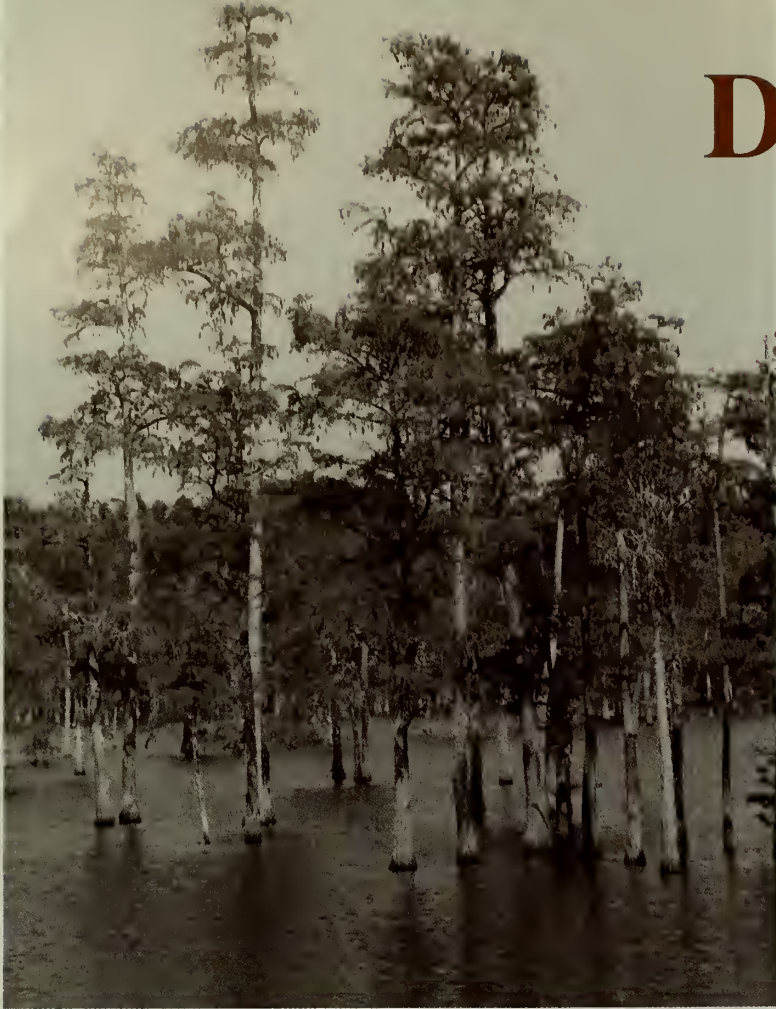
The proposed service area contains the state's most populous, fastest growing communities, which have suffered the severest impacts from prolonged drought. Ultimately, regional reservoirs will supplement community water systems that are inadequate to meet increasing water needs by providing long-term water supplies beyond the year 2010. The number of regional reservoirs needed has not yet been determined.

DNR prioritized development of the **West Georgia Regional Reservoir**, slated to be the first reservoir, during fiscal 1990. The 1989 General Assembly appropriated funds to study, select a site and acquire land for the reservoir and a **Regional Reservoir Program** was established within DNR to accomplish this. The program managed numerous site selection contracts and managed environmental and engineering studies to complete a permit application, filed with the Savannah District Corps of Engineers in June 1990. DNR also completed a study delineating the process for all future regional reservoirs, including a wetlands conservation plan, mitigation plan and environmental assessment. The study acknowledges the importance of local government support and funding for future reservoirs.

Completion of studies and construction of the reservoir will require time. DNR is encouraging local governments within the 44-county service area to use aggressive water conservation measures, and address tenets of the **1990 Georgia Water Conservation Act**.

FRESHWATER WETLANDS & HERITAGE INVENTORY

During the past year, DNR expanded programs of the Georgia Natural Heritage Inventory to include the inventory and protection of freshwater wetlands, resulting in a new program called the **Freshwater Wetlands and Heritage Inventory Program (FWHI)**. DNR established the wetlands program in response to the **1989 Growth Strategies Planning Act**. Part V of the Act directed DNR to establish minimum criteria for wetlands protection, for local governments to include



Types of wetlands being mapped by DNR include (clockwise, from this page, bottom): tidal streams, cypress swamps and freshwater wetlands. Inset (opposite), the shoals spider lily.



in land use planning. The FWHI program is developing a wetland data base to help local governments identify and protect wetlands and assess the effects of widespread land use changes that alter or destroy them.

Wetlands Inventory. The inventory involves classifying and mapping approximately 12 land-cover types derived from LANDSAT Satellite imagery. This information will be incorporated into DNR's computer (GIS) files and dispersed through the Department of Community Affairs to the Regional Development Centers, municipal/county governments and other groups. The FWHI Program, with assistance from a private image processing contractor, is expected to complete the wetland inventory by July 1991. The Program will be assisted by DNR's Game and Fish and Coastal Resources Divisions as well as other agencies, in gathering samples and verifying land-cover classifications. Aerial photography, topographic maps, soil survey maps and other resource information are being used to develop the data base.

Heritage Inventory. As part of an environmental assessment for the proposed West Georgia Regional Reservoir project, the FWHI Program conducted a rare plant and rare natural community survey and prepared a habitat characterization map of two alternative project areas. The habitat map will help assess loss of habitats associated with the project. The rare plant and significant natural community survey helped identify the reservoir's potential impacts on these rare natural resources.

The FWHI Program mapped and described seven habitat types using low-altitude aerial photographs, soil surveys, field surveys and LANDSAT imagery.

Thirteen rare plant populations representing six species were found in the study area, seven of which are within the proposed reservoir location. Two of these populations are state protected species. Eight significant natural communities were discovered, four of which would be directly impacted by the proposed reservoir.

Program staff participated in status surveys for rare plants, including shoals spider lily (*Hymenocallis coronaria*), a species found in rocky shoals of major rivers and near Georgia's fall line. One site along the Broad River near Anthony Shoals has Georgia's only existing population of federally endangered dwarf sumac (*Rhus michauxii*). Because the land is owned by the Corps of Engineers and managed, in part, by DNR as the Broad River Wildlife Management Area (WMA), protection efforts for the site are a top priority. Other rare plant searches verified historical plant sitings, and rediscovery of the showy "monkey face" orchid (*Platanthera integrilabia*) within Atlanta suburbs. Additional rare plant status surveys were initiated with a contractor who will work in southwest Georgia.

Staff worked with the Cherokee Garden Club, an affiliate of The Garden Clubs of Georgia, Inc., in setting up an award-winning display on Georgia's endangered plants, for the April 1990 Atlanta Flower

(I) Regional reservoirs are distinct from community reservoirs being developed by local governments. DNR proposes to build and operate the larger regional reservoir systems while communities develop their own local reservoirs, which jurisdictions may or may not elect to share. The Department assists communities in developing local reservoirs with technical advisement, which it will continue to provide.



J.C. Gayhart, Wilderness Graphics



Nongame programs during the year included (clockwise, from bottom): wildlife rehabilitator workshops; wood stork surveys; and hacking of ospreys and golden eagles.

Show. Staff completed a project with ITT Rayonier, Inc., to plot significant rare plant sites reported from or near company lands; field studies were begun to locate priority species in the field.

Protection of significant natural areas on newly acquired state lands, particularly Yuchi WMA in Burke County, were begun. Recovery efforts for the green pitcherplant (*Sarracenia oreophila*) near Lake Chatuge were continued. Efforts to produce video material on rare plant conservation and identification were begun, and plans were made to complete a film on Protected Plants during fiscal year 1991.

In other activities, the FWHI staff processed 153 records of rare element occurrences, 11 managed area records and 112 source abstract records. Staff also responded to 560 information requests for Heritage data base information or site reviews and 132 state clearinghouse requests for environmental reviews.

THE NONGAME WILDLIFE PROGRAM

Georgia's **Nongame Wildlife Conservation Program and Habitat Acquisition Fund** was enacted into law in 1985 by the General Assembly. Since 1986, DNR has focused a successful team effort on promoting public awareness of nongame, or nonhunted, plants and animals, and improving their odds for survival. During fiscal year 1990, the program saw the results of diligent efforts to raise public support.

DNR and the Georgia Department of Revenue cooperated in the first statewide **Income Tax Checkoff donation program**, for tax year 1989. The effort raised over \$300,000 to benefit nongame species in Georgia. According to the Department of Revenue, over 69,982 Georgians made voluntary contributions through the checkoff. The money, combined with other private donations totaling more than \$631,265 through fiscal 1990, is funding a host of restoration programs, population status surveys and other research efforts designed to preserve nongame species, and the crucially important natural diversity that their populations represent.

In Georgia, approximately 3,600 plants and 875 animals are classified as nongame. During the fiscal year, surveys determined the population status, and threats to, species including the **wood stork** in coastal foraging areas; **bat populations** in caves on the Crockford-Pigeon Mountain Wildlife Management Area (WMA); the **gopher tortoises** on state controlled lands; and the **alligator snapping turtle** in the Flint River. A year-long study examined **nongame birds'** usage of gamebird food plots at Clarks Hill WMA in northeast Georgia. The Nongame Program also administered, with federal funds, several projects, including **bald eagle** nesting surveys, additional **wood stork** studies, programs for **coastal endangered species** like **sea turtles** and **manatees**, and in cooperation with the University



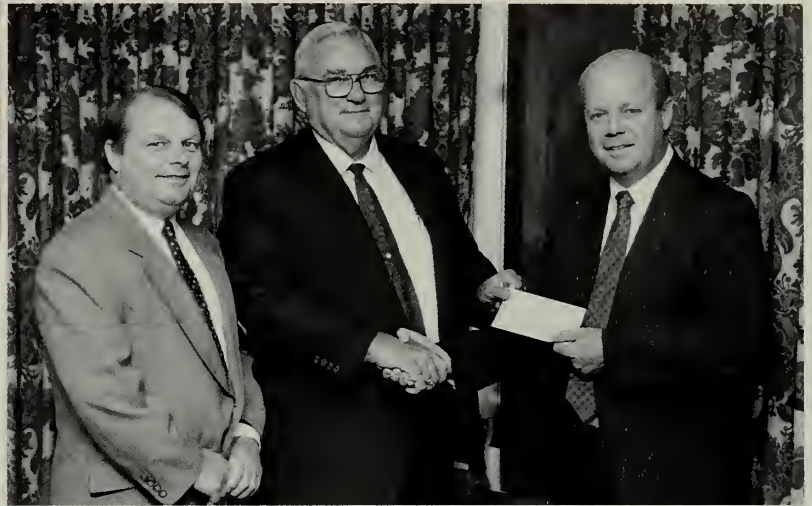
of Georgia's Institute of Ecology, studies to determine the population status of the **Conasauga logperch** and the **amber darter**.

Other accomplishments included the publication of educational pamphlets on **Reptiles of Georgia**, the **Brown Thrasher**, the **Wood Stork**, the **Eastern Box Turtle**, and the **Kingsnake**. In raptor projects, three **peregrine falcons** were hacked (raised and released) from the Georgia Power Co.'s urban hacking tower in downtown Atlanta; three peregrines were hacked from Mount Yonah in North Georgia; and four **ospreys**, nine **bald eagles** and 13 **golden eagles** were hacked at sites including Lakes West Point and Allatoona and at Crockford-Pigeon Mountain WMA. Other projects like **wildlife rehabilitator workshops**, **nongame lectures**, and **nongame interpretive trails** in state parks and on state Wildlife Management Areas helped educate the public concerning these valuable nongame species. As the year ended, the Nongame Program planned 35 nongame projects for fiscal 1991.

CHANGE MANAGEMENT SEMINARS

Seminars to promote staff involvement in DNR's **Five-Year Strategy** planning process progressed during fiscal year 1990 as **Change Management** training was completed statewide. At the end of the fiscal year, 1,060 DNR staff members had participated in seminars encouraging them to take an active part in determining, and meeting, the Department's management objectives.

Change Management training has now given employees from all levels in every Division a chance to express their perspective, help evaluate current management actions and determine future management direction. Intended not only to get people involved, but also to improve communication throughout DNR, the seminars have encouraged management to keep staff



Department of Revenue Commissioner Marcus Collins (center) and Director Donald Steele present DNR's Lonice C. Barrett with a check for proceeds from the first Nongame Wildlife Tax Checkoff, which raised over \$300,000 to support nongame programs.

informed about important issues. Through principles taught in the seminars, staff members from all Divisions report having successfully addressed problems related to personnel, office location and budget.

DNR PERSONNEL SERVICES

Personnel Services, for the first time, set definitive goals as part of DNR's **Five-Year Strategy** planning process that included enhancement of employee career development programs; and increasing participation of women and minorities in management throughout the Department. Among other major accomplishments, a highly specialized training program was designed and implemented for new handicapped employees in the Emergency Operations Center. Other progress included development of a disciplinary actions workshop, helping develop a training video for Change Management seminars and designing a data base management system for keeping track of employee training.

Career development specialists in the office visited over 6,000 students at 45 high schools throughout Georgia and interviewed over 400 students at 43 colleges and universities throughout the Southeast. Career information was mailed to over 2,000 applicants for positions.



Environmental Protection

During fiscal year 1990, EPD expanded its Emergency Response Team for better effectiveness during chemical emergencies; and reestablished its top goal of bringing levels of chemicals in the environment to levels below established standards.

Toward meeting the number-one priority of eliminating toxic chemicals in Georgia's air, land and water, DNR's Environmental Protection Division (EPD) took major steps to further control toxics during the year. Progress included initiating the most detailed study on ozone undertaken in any U.S. city; screening over 300 industries' emissions of several hundred air toxics; and regulating an additional 119 toxics in Georgia waters. EPD also began implementing Georgia's new **Comprehensive Solid Waste Management Act**, which makes provisions for waste reduction, improved landfill operations and helping communities effectively plan for future disposal needs.

Environmental Protection Division priorities set during fiscal year 1990 underscore DNR's ongoing commitment to eliminating toxics, meeting air quality ozone standards, controlling nonpoint water pollution and ensuring clean surface and groundwater supplies. These priorities include:

- **Reduction or elimination of any source of chemicals in the environment to levels below established standards for air, surface water, groundwater and community water systems, and solid waste management facilities.**
- **Completion of a comprehensive control program for nonpoint sources of water pollution.**
- **Completion of a Comprehensive Groundwater Management Program to manage**

groundwater availability and protect and improve groundwater quality throughout Georgia.

- **Attaining the federal ozone air quality standard in the metropolitan Atlanta area.**
- **Meeting the public's expectations for effective environmental monitoring, enforcement of environmental laws and pollution prevention.**

GRANTS AND LOANS

EPD disbursed \$7.5 million to Georgia communities during the fiscal year under the Environmental Facilities Grants Program, to fund the construction or improvement of environmental facilities. One million was allocated to fund emergency water and sewer improvements; \$1.85 million supported solid waste management projects; and \$4.65 million funded water and sewer projects needed by communities to support new or expanding industries. Twenty of the 48 communities that received water and sewer grants were also assisted with loans from the Georgia Environmental Facilities Authority (GEFA). The Division also administers a State Revolving Loan Fund to make low-interest loans available for sewage treatment system improvements. During the fiscal year, approximately \$30.3 million was disbursed to 10 city and county governments to fund such improvements.

AIR PROTECTION

Georgia's air met all state and federal air quality standards during the year with the exception of the standard for ozone in the Atlanta metropolitan area. (See Fig. 1.) **Ozone** is a pollutant formed when volatile organic compounds (VOCs) and oxides of nitrogen in air mix under certain weather conditions. Ozone-forming pollutants come from automobiles, industries and the burning of fuel. During the fiscal year, EPD began a special summer study in cooperation with U.S. EPA, which allows more sophisticated and detailed air measurements of ozone, VOCs and nitrogen oxides than are available in any city in the nation.

Since 1979, over \$790 million has been spent mostly by industries to lower VOC emissions in Atlanta's air. In the past decade, over 83,000 tons of VOCs per year have been eliminated in the metro area by increasingly stringent controls. Anticipated amendments to the **Federal Clean Air Act** are expected to further reduce ozone in major cities including Atlanta by requiring cleaner emission systems in automobiles.

The state's **Vehicle Inspection and Maintenance Program** is operated by the Georgia Department of Public Safety (DPS). EPD, which licenses emission testing stations, works with DPS to monitor the data from emissions testing during the year, to detect unusually high or low failure rates. EPD reported the results to licensed testing stations for necessary follow-up action, and distributed other reports to assist in maintaining consistency among all inspection stations in the program.

The emissions program detected vehicle exhaust failures at a rate of 9.5 percent of the 1,109,607 vehicles tested in the Atlanta area during fiscal year 1990. Newer vehicles with better emission controls account for a drop in the failure rate (previously 13 percent).

Emission Inventories. EPD completed an inventory of volatile organic compounds, carbon monoxide and oxides of nitrogen in an 18-county area around metro Atlanta, plus 25 miles farther out for major industries, for the year 1987, using the latest methods from U.S. EPA. The inventory will be used as future state regulations are developed for ozone control.

Air Toxics. EPD continued to inventory compounds released to Georgia's air under the **Federal Community Right-to-Know Act**. Program personnel evaluated the toxicity of air emissions from 306 new or newly-expanded industrial operations using the air permit process. Many of those facilities were permitted using controls to reduce air toxics and other air emissions. (Upcoming amendments to the Federal Clean Air Act are expected to include a new section on toxic emissions control.)

Reduction of Sulfur Gases. All kraft pulp mills in Georgia affected by new state Air Quality Control Rules requiring them to reduce sulfur gases have submitted plans for odor-reducing equipment installations. EPD began evaluating these plans during the fiscal year, and issued permits for reduced sulfur emissions. The odor-control technology plants are required to install will also eliminate 80 to 90 percent of **methanol** and **acetone** (air toxics) emitted. In 1988, these two

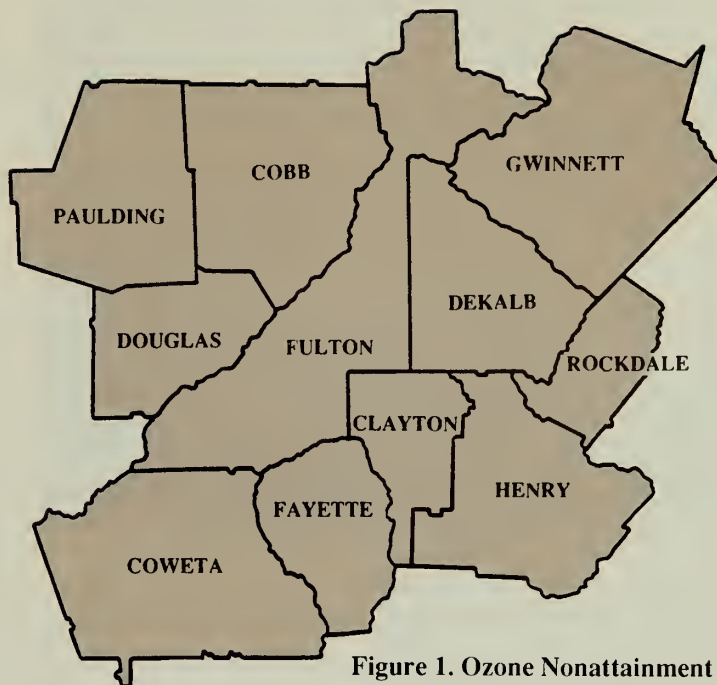


Figure 1. Ozone Nonattainment Area

gases from pulp mills accounted for 46 percent of all air toxics released in Georgia. A substantial reduction in air toxic releases will be an added benefit.

Quarry Permits. In response to increasing public concern over dust from crushed stone quarries, EPD required existing quarries to install air sampling equipment on their properties. The requirement began with 20 of the largest quarries. EPD now requires air sampling for all new quarries and current air sampling around new quarries indicates all air quality standards are being met.

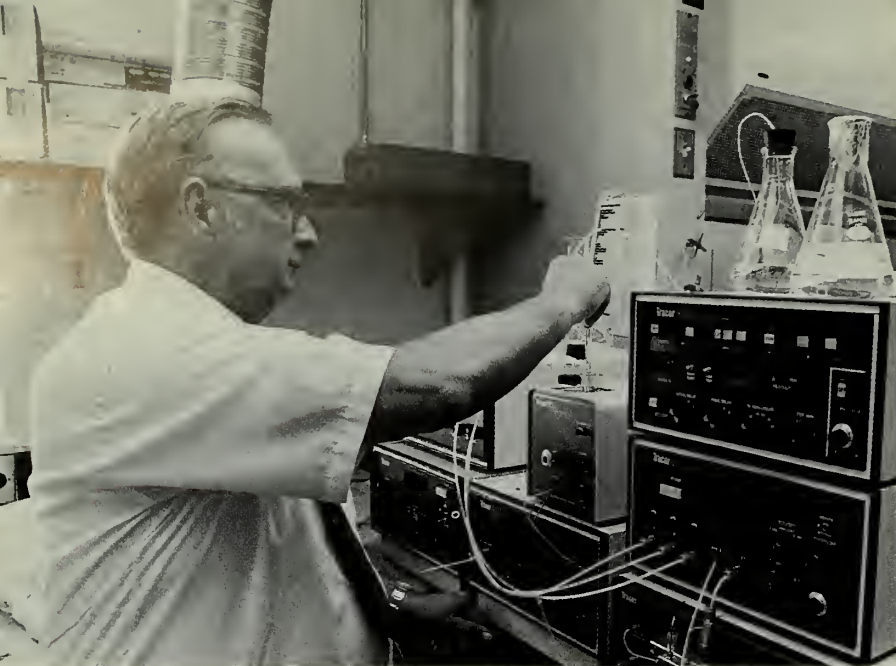
Acid Rain. Air sampling for acid rain continued during the year through a statewide testing network. No significant change has occurred in the annual average acidity of rainfall in Georgia which remains at a pH level of approximately 4.6, only slightly more acidic than unpolluted rainfall, which ranges from a pH of 4.8 to 5.6.

WATER RESOURCE MANAGEMENT

Water Supply. EPD provided technical advisement and leadership for city and county efforts to develop **community water supply reservoirs** during fiscal year 1990. These are financed, built and operated by local governments. Community reservoirs will provide water for present and future needs, support growth and protect against the damaging effects of drought. During the year, 22 community reservoir projects were underway in Georgia. Of these, two were completed, two were under construction, three were in the design or land-purchase phases, and seven were being reviewed by the U.S. Army Corps of Engineers. Site selection studies were in progress for the other eight community reservoirs.

During fiscal year 1990, EPD provided considerable information and technical assistance to local governments, Regional Development Centers, the Corps of

Air throughout Georgia meets all state and federal quality standards; however, the metro Atlanta area outlined above remains in violation of ozone standards for a number of days each year.



EPD routinely monitors stream samples from throughout the state to determine water quality. Here, a test for a sample's organic makeup.

Engineers and other groups concerning the proposed **reallocation of Lake Lanier**. The proposed plan would reserve a portion of the current hydropower storage capacity of the lake for drinking water to supply the needs of metropolitan Atlanta through the year 2010. The project is being delayed by a lawsuit initiated by Alabama state government.

Agricultural water withdrawal permitting proceeded rapidly during the year as EPD issued approximately 2,500 permits to farmers. A total of 4,500 have been permitted since 1988. EPD expects to issue approximately 5,000 more permits over the next year, and ultimately a total of 12,000 to Georgia farmers. Most permits have been issued to farmers in southwest Georgia. (See Fig. 2.)

Disaster Assistance. EPD provided disaster relief in conjunction with the federal and Georgia Emergency Management (FEMA/GEMA) agencies when President Bush declared portions of Georgia flood and tornado disaster areas in winter, 1990. EPD distributed \$3.2 million in federal grant monies during the fiscal year to 1,506 applicants in 38 counties throughout the areas; and made low interest loans available to other qualifying applicants.

Floodplain Management. In ongoing efforts to reduce flood damage in Georgia, the Floodplain Management Unit distributed over 3,100 flood maps, visited 43 communities, reviewed 662 development projects and answered approximately 1,100 technical assistance requests. The unit also presented and assisted with eight workshops promoting flood damage reduction during the year.

Safe Dams Program. EPD's Safe Dams Program performed 287 annual inspections of high hazard dams throughout the state to reduce the risk of dam failures. The program also reviewed 43 sets of engineering reports, construction plans and specifications for proposed new dams and proposed repairs to existing dams. Flood routings were modeled for 56 dams to simulate

the danger that potentially exists if any fail, and to enable staff to properly categorize the dams.

Under 1990 amendments to the **Georgia Safe Dams Act**, local governments must notify owners of nonregulated dams when proposed developments downstream may require that the dam be reclassified as one that, in the event of failure, could endanger people. When a dam is reclassified because development has occurred downstream, it then becomes a regulated dam and must comply with more stringent construction/operation regulations.

WATER PROTECTION

State and federal water quality laws have resulted in enormous progress since 1965 in cleaning up waters polluted by inadequately treated wastewater. In fiscal year 1990, Georgia's **Clean Water Strategy** continued the clean-up of rivers, streams and lakes while improvements to Georgia's water quality standards were adopted into rules. These included provisions for:

- **Stricter standards for levels of toxic pollutants to protect fish and aquatic wildlife. Reduction of toxic pollutants will also aid in reducing any potential cancer risk for humans who eat fish from Georgia's streams and waterways.**
- **Adoption of revised acceptable bacteria levels for streams designated for fishing and used as recreational, or swimming, waters by the public.**
- **Environmental assessments and public participation requirements for new or upgraded municipal wastewater treatment facilities.**
- **Emergency action rules for a major sewage spill from a municipal wastewater treatment facility.**

The **Clean Water Strategy** also addressed specific objectives during fiscal year 1990 to improve water quality in Georgia. These included:

- **Encouragement of water reuse projects.** Several projects in the state now use treated wastewater for irrigation of golf courses, athletic fields and general landscaping.
- **Imposition of a December 31, 1991 deadline for wastewater dischargers** to the Chattahoochee River between Buford Dam and Lake West Point, to reduce discharges of phosphorous by about 85 percent, in order to slow the rate of stagnation in the lake.

Toxic Pollutants. During the fiscal year the Board of Natural Resources increased from 13 to 132 the number of toxic water pollutants regulated in Georgia waters. EPD initiated control strategies and permitting for toxic pollutant dischargers including 40 industries and nine municipal facilities. The permits require improved wastewater treatment, to meet the revised water quality standards.

The State Revolving Loan Fund, which makes low-interest loans available to communities to upgrade municipal wastewater treatment facilities, provided

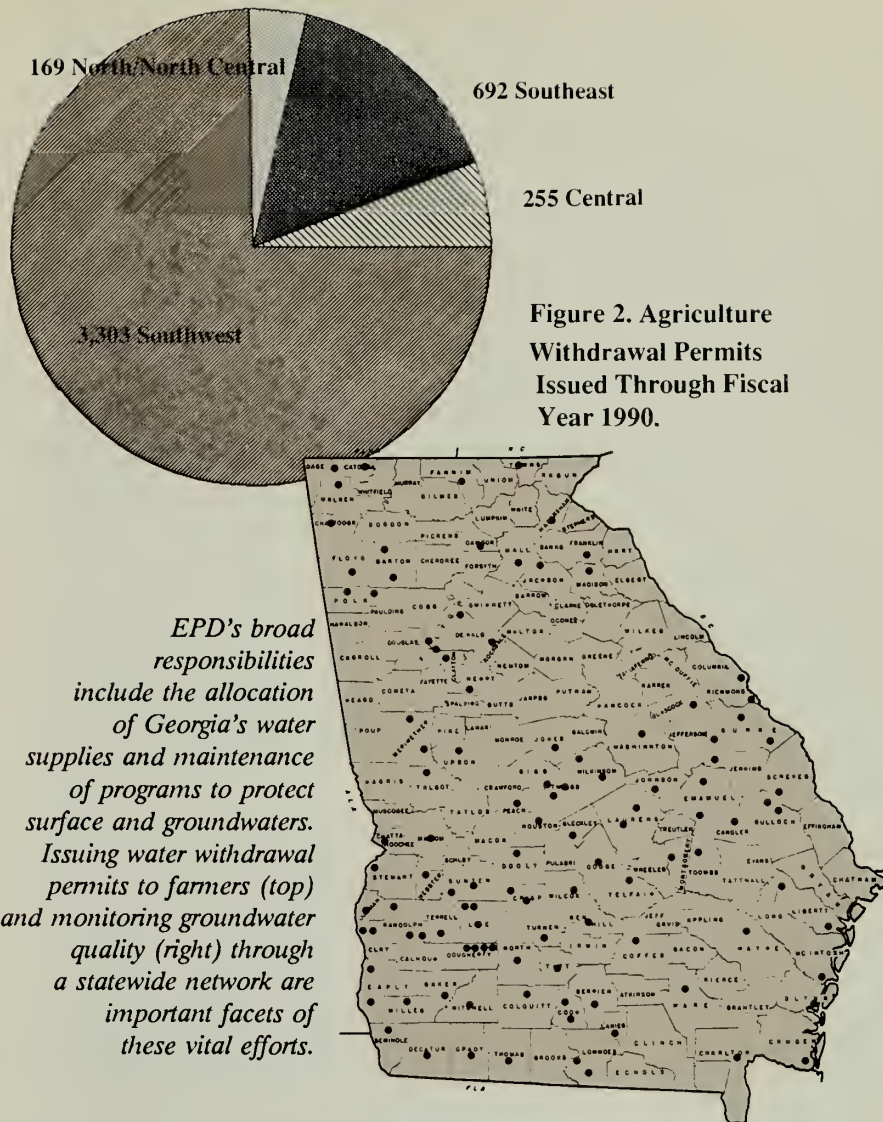
over \$30 million in assistance during fiscal year 1990. With loans, communities increase the capacity of their treatment systems to support growth and eliminate potential health hazards. Loans totaling almost \$87 million have been made to 33 communities since the program's 1988 inception. Federal funds will capitalize the program through 1994, when it will become self-perpetuating through repayments of current loans. To date, the state has contributed over \$17 million in 20-percent matching funds to receive the federal funds for wastewater system upgrades.

Municipal Wastewater Treatment Improvements. By 1990, all but three of the state's 539 municipal wastewater treatment facilities had completed construction necessary to achieve full compliance with all water quality requirements of the Federal Clean Water Act. Great progress has been made in the past five years. As recently as 1985, 112 municipal facilities still failed to meet the required standards. The three remaining facilities are scheduled to complete upgrades in early 1991. Georgia's overall compliance rate of 93.9 percent for municipal wastewater treatment plant operation is well ahead of the national compliance rate of 79.9 percent. During fiscal year 1990, DNR issued 58 consent orders to local governments, collecting \$137,000 in negotiated settlements for failure to meet adequate wastewater treatment standards.

EPD began a **Municipal Water Pollution Prevention Program (MWPP)** during the fiscal year to assist in keeping wastewater treatment plants in compliance with permitted limits on pollutants. The program identifies problem areas at treatment facilities and offers guidance before noncompliance problems occur. The MWPP program is intended to reduce the need for enforcement actions by EPD, while protecting the investment in municipal wastewater treatment system improvements and safeguarding water quality in general.

Clean Lakes Program. During fiscal year 1990, the General Assembly passed legislation (Senate Bill 714), mandating that EPD conduct comprehensive studies of publicly owned lakes covering over 1,000 acres. The state must also develop water quality standards for pH, fecal coliform bacteria, chlorophyll *a*, total nitrogen, total phosphorous and dissolved oxygen. Comprehensive studies of **Lakes Lanier, Walter F. George and West Point** were initiated during 1990 and studies of three additional lakes will be initiated in each subsequent year, provided funds are available. Although the legislature provided no funding for 1990, EPD has received funds through the U.S. EPA.

Nonpoint Sources of Water Pollution. The Federal Clean Water Act of 1987 required states to assess nonpoint (non-stationary) sources of water pollution and develop a plan to address nonpoint pollution problems. During the fiscal year, the U.S. EPA approved Georgia's **Nonpoint Assessment Report and Management Plan** and awarded EPD a federal grant to support its implementation. EPD is working with the Georgia Soil and Water Conservation Commission to identify and clean up problem animal waste lagoons from agricultural operations; and is also working with the Georgia Forestry Commission to evaluate the ef-



fectiveness of forestry management practices to curb erosion and siltation of streams.

The **Community Stream Management Task Force** completed a report on ways to effectively monitor and enhance urban streams. The report emphasizes the roles of various levels of government and individuals in stream protection. The task force, with local governments, develops local monitoring programs to keep urban streams clean.

LAND PROTECTION

Solid Waste Management. Georgia residents and businesses produce over 13,500 tons of solid waste daily. Because 70 percent of the state's existing landfills will reach their permitted capacity within two years, EPD has actively promoted cooperation between local and state governments, private enterprise and the public, to solve the state's solid waste dilemma.

While continuing enforcement efforts to make sure communities and individuals comply with environmental laws regulating sanitary landfills, EPD's Land Protection staff promoted alternatives to landfill disposal by giving slide shows and distributing educational materials on waste reduction and re-use and home and community recycling. These alternatives to disposal are already being implemented in numerous communities and will be vital for all communities in the future. Though sanitary landfilling will continue as

Figure 3. Groundwater Monitoring Network Well Locations



One of EPD's newer programs is the regulation of Underground Storage Tanks (top). A new state solid waste management law was passed in 1990, which makes major new provisions to help communities promote recycling and waste reduction (see box, right).

New Provisions For Solid Waste Management

The General Assembly's 1990 passage of the **Comprehensive Solid Waste Management Act** will widely impact future management of solid waste in Georgia. Important provisions of the new law include:

- A statewide (per capita) goal of a **25 percent reduction in solid waste disposed of at landfills or incinerators by July 1, 1996.**
- State certified operators of landfills and incinerators by **July 1, 1992.**
- A ban on disposal of lead acid batteries in landfills by **January 1, 1991.**
- Development of a **State Solid Waste Management Plan by January 1, 1991.**
- Development of local comprehensive solid waste management plans to assure adequate solid waste handling for a 10-year period by **July 1, 1992.**
- Implementation of a negotiation process for resolution of nonenvironmental conflicts regarding siting of new disposal facilities.
- Establishment of a **Recycling Market Development Council** that will focus attention on the development of markets for recovered materials.

a necessary means of disposal for certain wastes, citizens increasingly oppose the siting of landfills, and costs to operate landfills continue to rise.

New solid waste management rules adopted by the Board of Natural Resources in 1989 were intended to improve landfill operations. These include requirements for liners and leachate collection systems at

designated landfills; groundwater monitoring; stricter methane gas control; and proper closure and post closure requirements.

During fiscal year 1990, EPD approved additional capacity for 38 sanitary landfills. The modifications included groundwater monitoring at landfills which were not previously equipped with groundwater monitoring wells.

Hazardous Waste Management. EPD completed a seven year effort to bring all the state's hazardous waste treatment, storage and disposal facilities under final permits as mandated by state and federal law. Hence, Georgia became the first state in the nation to issue or deny hazardous waste permits to all its facilities, issuing 81 permits and denying seven. Through these permits, existing disposal of hazardous waste in Georgia was curtailed and releases from prior disposal sites are being monitored and cleaned up. Facilities that operate storage or treatment units must comply with strict permit conditions for operation.

As required by federal law, Georgia submitted a **hazardous waste Capacity Assurance Plan (CAP)** to the U.S. EPA, describing current hazardous waste generation, treatment, storage and disposal in the state and projecting hazardous waste management capacity over the next 20 years. The plan also outlines future hazardous waste management needs. Generating approximately eight million tons of hazardous waste in 1989, Georgia industries neutralized and rendered nonhazardous on-site all but 93,000 tons, which was transported to other states for proper disposal. Numerous industries have recently made substantial, permanent reductions in the hazardous waste they produce by changing plant operations. Source reduction measures like these remain the best solution for hazardous waste.

Erosion and Sedimentation Control. Sediment, from erosion caused by land disturbing activities, is a significant pollutant of surface waters in Georgia. Sedimentation increases flooding, displaces capacity in water supply reservoirs, boosts the costs of water treatment and can destroy recreational facilities. It ruins habitat for fish, while disturbing the ecological balance of streams and aiding the transport of pollutants. The **Georgia Erosion and Sedimentation Act**, strengthened by 1989 amendments, regulates certain development and construction activities. DNR's comprehensive control program for nonpoint sources of water pollution includes control of erosion and sedimentation.

Six statewide orientation meetings were held and five seminars conducted by local districts. Approximately 200 people were trained through Southern Tech's short courses on erosion and sedimentation control. EPD has certified 116 out of 159 counties (73 percent) and 212 out of 537 active municipal governments (40 percent) as local permitting authorities for land disturbing activities. EPD notified certified local governments to update their ordinances to comply with 1989 amendments.

Surface Mining. EPD regulates over 490 surface mining operations, including 78 crushed stone quarries, 64 instream sand dredging operations and 151

kaolin operations under the Georgia Surface Mining Act during the year. The Act provides for environmental protection during site development and operation and for timely reclamation of all disturbed lands. Regulation of these operations includes nonpoint pollution source control for water protection.

EPD's permitting of crushed stone quarries remained the most controversial issue regarding surface mines, as the rock suitable for crushed stone aggregate is found only in certain locations and must be mined where it occurs. The search for sites to establish quarries for this mineral has spread into urban areas, and developing rural areas, where citizens usually oppose quarries. EPD has developed the most stringent air quality standards and monitoring requirements for crushed stone quarry operations in the nation.

Underground Storage Tank Regulation. Georgia's 15,000 underground storage tank facilities possess about 50,000 tanks. Under authority of the amended 1988 **Georgia Underground Storage Tank Act**, DNR promulgated rules regulating underground petroleum storage tanks (UST's). The program established standards for new and existing tanks and corrective requirements to clean up tanks that leak.

The state's program also provides UST owner/operators with a state-funded trust fund to partially cover their liabilities in the event of leakage, as required by law. Capitalized by a voluntary one-tenth cent per gallon fee on products stored in tanks, the trust fund is growing at a rate of about \$4 million each year. As of fiscal year 1990, the fund's principal was \$7.5 million. DNR has begun plans to provide state contractors who would investigate and clean up releases for trust fund participants.

During the fiscal year, 501 tank leaks were reported to EPD. To date, over 1,030 releases have been reported and site investigation and clean up have been voluntarily begun at 591 sites. Of these, 52 have completed corrective actions.

GEOLOGIC SURVEY

DNR's Geologic Survey published 12 reports on technical investigations of Georgia's geologic, mineral and water resources during the fiscal year. Information on groundwater quality and availability was monitored statewide through the Groundwater Management Program network (Figure 3). Georgia's comprehensive computer Geographic Information System (GIS) emphasized preparing maps showing areas poorly suited for siting landfills, and on pollution susceptibility maps, and was expanded to include 38 data bases.

The Survey assisted nine communities in siting water supply wells. Of the 42 well sites selected, only three communities drilled wells. The wells averaged yields of 90 gallons per minute with ranges of 22 to 172 gallons per minute. Computer modeling of coastal plain aquifers continued, and the model developed for the Floridan aquifer was used to predict the impact of withdrawals on groundwater levels.

To enhance **surface mining**, the Geologic survey investigated minerals that may have significant economic value in Georgia, including gold, phosphate,



The Geologic Survey conducts vibrocoring on Georgia's coast to search for heavy mineral-bearing sands.

sulfides, iron ore, high magnesium carbonates, construction sand and heavy mineral bearing sands. During the end of the fiscal year, the Geologic Survey completed vibrocoring along Georgia's coast for heavy mineral bearing sands.

EPD completed 2,207 feet of drilling at 11 sites in the state, as well as five monitoring wells in conjunction with hydrologic or geologic investigations. EPD also oversaw the regulation of water well drillers (208 are licensed in Georgia), completed 45 water well inspections and issued permits for six oil and gas exploration tests. Geologic Survey investigations were featured in 23 professional meeting presentations, through responses to about 3,000 information requests and through four public awareness booths at regional exhibitions.

PROGRAM COORDINATION

Under requirements of the Federal Emergency Response and Community Right-to-Know Act (Title III of the Superfund Law), all industries handling **toxic substances** in Georgia must notify state and local authorities of these chemicals and must also prepare emergency response plans to protect the public from hazardous substance releases. Over 3,000 industries have filed these notifications with the Environmental Protection Division to date. Industries must also file annual **chemical inventory updates** and **report releases** of toxic chemicals that occur during manufacturing. This information was made public during the fiscal year as EPD published the second annual **Toxic Release Inventory Report** covering toxic substance releases during 1988. According to the reports, total toxic chemical releases in Georgia decreased by nearly 18 million pounds when compared to 1987 figures.

DNR's **Emergency Operations Center** received more than 3,000 spill notifications during the fiscal year, over 300 of which required that DNR's Emergency Response Team respond to the field. EPD met a major goal during the fiscal year as the Emergency Response Team was expanded for better effectiveness during chemical emergencies. Five full-time professionals were added to the team and given training to direct operations and prepare enforcement actions. The new full-time team was fully active by December 1990.



Karen Lawrence

From left: Georgia's population of wild turkeys now exceeds 325,000 birds; and 13,000 Canada geese now reside here, as the result of successful DNR stocking programs.

While fulfilling its obligation under law to manage, protect and promote the wise use of all Georgia's fish and wildlife, the Game and Fish Division made great strides during the fiscal year in acquiring lands for wildlife management to increase opportunities for public hunting and fishing. As the Division completed its second major year of wildlife land acquisitions in fiscal 1990, an additional 29,514 acres of lands were brought under state ownership, giving Georgia a total of 144,612 acres of public hunting and fishing areas. Meanwhile, as a result of diligent efforts to upgrade the effectiveness of conservation law enforcement, DNR's conservation officers took another important step toward national accreditation by the Commission on Accreditation for Law Enforcement Agencies.

The state's abundant freshwater fish, wildlife and native plants are irreplaceable resources that enhance the quality of life for all Georgians. Wise management of these resources has been especially critical in recent years — widespread land use changes remain the biggest threat to fish and wildlife, and their habitats. To effectively improve these resources as land use changes continue, and to increase related recreation, during fiscal year 1990 the Game and Fish Division set the following goals under DNR's *Five-Year Strategy*:

- Meet public needs for wildlife-oriented recreation by continuing to acquire and develop lands for wildlife management and recreation.
- Protect wildlife and fisheries by improving the effectiveness, efficiency and professional status of conservation law enforcement.
- Meet public needs to enjoy Georgia's freshwater fisheries by expanding their protection and development.
- Meet public needs to enjoy Georgia's wildlife resources by more effective use of information to manage wildlife and protected plants.
- Manage the Sapelo Island National Estuarine Research Reserve to encourage further

scientific research and to offer added educational and interpretive programs to interested citizens.

LAND ACQUISITIONS

After Governor Harris and the General Assembly approved two \$15-million issues of general obligation bonds in 1988 and 1989, the Department established a **Land Acquisition Program**, which is one of the most active in the Southeast. During fiscal year 1990 DNR acquired five parcels totalling 29,514 acres at a purchase price of \$12.57 million (see Table 1). These acquisitions brought to 56,708 acres the total lands purchased during fiscal years 1989 and 1990 to provide wildlife management areas (WMAs), public fishing areas (PFAs) and small-game and field-trial areas.

Acquiring wildlife lands is vital for sportsmen, the economy and wildlife. Public hunting and fishing opportunities have declined since the mid-1970s as many landowners who once leased lands to the state for public hunting have begun leasing them to private hunting clubs for higher fees. Land use changes have steadily reduced forestland in Georgia by more than 1.2 million acres since 1972, taking valuable habitat away from wildlife. Acquisition of wildlife management lands offsets these trends and also ensures that Georgia sportsmen, who spend about \$1.4 billion yearly on hunting and fishing, have access to public hunting and fishing areas. Activities such as camping, birding, wildlife observation and outdoor photography are also popular on WMAs, and add approximately \$450 million to the economy annually.

Lands were purchased based on their suitability to produce wildlife, their proximity to population centers and their desirable qualities as unique natural habitats — many properties include river frontage, beaver ponds, oxbow lakes and other types of wetlands.

The \$30 million in 1988-89 bond funds has allowed DNR to purchase land while prices and interest rates are low, and a 1987 increase in hunting and fishing license fees will repay the bonds over a 20-year term.



Timber harvesting takes place on WMAs to promote forest health and on some lands, together with revenues left after debt payments, to cover the costs of managing the sites. Management activities including unpaved road development and planting food plots will increase as the timber matures and produces greater revenues.

GAME MANAGEMENT

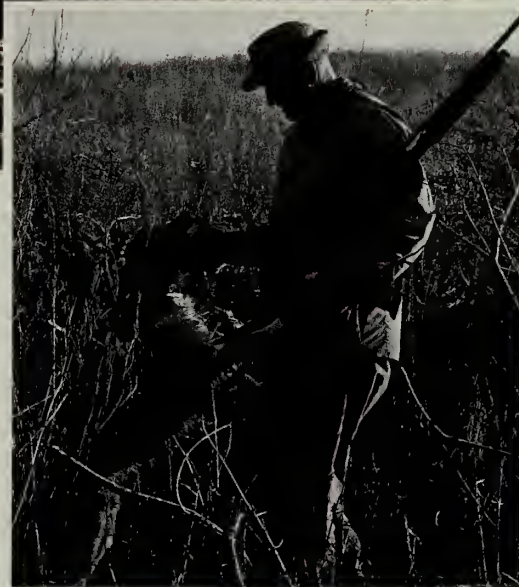
Almost 66 percent of Georgians enjoy wildlife-related recreation including hunting and fishing. To provide them with recreation areas, DNR operates 65 WMAs on more than one million acres of land. Large and small game hunters, fishermen, birders, wildlife photographers, campers and other wildlife enthusiasts increasingly use these areas. Hunters now number half a million in Georgia. In fiscal 1990, more than 65,000 deer hunters used state-managed WMAs, an increase of 13 percent over fiscal year 1989.

Deer. During fiscal year 1990, DNR encouraged the harvest of more does — the most effective method of controlling the size of Georgia's deer herd, which reached an all time high of 1.25 million during the 1988-89 season. Increased either-sex hunting days produced a harvest of 132,000 does, or 41 percent of the 323,000 deer taken during the 1989-90 season. The greatest number of does were harvested in the upper coastal plain and piedmont regions, where residents report the most deer-damage incidents in the state.

Deer hunting in Georgia generates about \$346 million yearly. DNR's goal is to maintain a large enough herd for recreational purposes, while controlling deer populations through adequate harvests. Hunter participation remains the most effective means of herd management.

Wild Turkeys and Canada Geese. During fiscal year 1990 DNR released 207 wild turkeys on 21 sites as part of a successful 20-year stocking program. Georgia's wild turkey population now exceeds 325,000 birds and the stocking program is being brought to a close. DNR has scheduled spring gobbler seasons in 138 counties for 1991.

Since 1978, DNR's Canada goose restoration pro-



White-tail deer harvested in the '89-90 season totaled 320,000, including 132,000 does, reflecting good hunter participation in herd control efforts.

**Table I. Land Acquisitions
(Fiscal Year 1990)**

Tract Name/County	Acreage	Type
Ocmulgee WMA/Pulaski	5,837	WMA/PFA
Miller County WMA/Miller	4,681	WMA
Screven County WMA/Screven	10,950	WMA
Tattnall County WMA/Tattnall	5,566	WMA
Johns Mountain WMA/Floyd	2,480	WMA
Patrick's PFA/Berrien	1,060	PFA
TOTAL ACREAGE	30,214	

gram has stocked 13,000 birds in Georgia, and the resident population is now over 20,000. The first goose-hunting season was held in January 1990 at six locations. Hunters took 276 geese during this limited season. Two four-day seasons were slated for January 1991.

Alligators. Alligators have become so plentiful in Georgia that they have been removed from the endangered species list and have, in certain places, become a nuisance. During fiscal 1990, DNR authorized alligator agent-trappers to take 313 nuisance alligators.

Nongame Wildlife. Staff of the Game Management Section played a role in DNR's Nongame Wildlife Program (see *Special Programs*, page 4). Activities



Anglers enjoy a North Georgia trout stream. DNR raised and stocked about 300,000 catchable trout into trout streams during fiscal year 1990.

included rearing and releasing bald eagles, golden eagles, peregrine falcons and ospreys; surveying various nongame species; and developing a number of educational brochures. DNR also built a nongame wildlife office on Rum Creek WMA with the cooperation and support of Georgia Power Company, which owns the land.

Waterfowl Conservation. The Department has built six waterfowl impoundments and other habitat improvements by matching state funds with monies from the Matching Aid to Restore States' Habitat (MARSH) program operated by Ducks Unlimited. During fiscal year 1990, Game Management completed and dedicated major waterfowl projects at the Altamaha, Blanton Creek and Grand Bay WMAs and began or continued projects on five more WMAs.

Wildlife Surveys and Technical Services. DNR continued surveying all major wildlife species to detect and solve specific wildlife management problems and to develop a scientific basis for hunting season recommendations. The Section helped landowners manage properties to enhance wildlife populations and resolve wildlife nuisance problems. The Section also prepared a wildlife impact assessment for the proposed West Georgia regional reservoir.

DNR foresters managed woodlands on WMAs, PFAs and state parks during the fiscal year. Selective timber management improved wildlife habitat and forest health, and timber revenues helped fund WMA operating costs.

FRESHWATER FISHERIES

Public Fishing Lakes. The Department continued the development of public fishing lakes in fiscal year 1990. The Section acquired, for \$1.5 million, a 1,060-acre Berrien County site with over 80 man made lakes and an extensive canal system. The site, eight miles east of Tifton and 10 miles east of Interstate 75, includes ten larger lakes (about 350 acres) which will be managed for public fishing. The smaller ponds will host special events, such as fishing rodeos for children, and will serve as wintering areas for waterfowl.

DNR must improve fish populations in all the lakes before they can support public fishing. The first lake opened to public fishing in September 1990. Additional lakes will be opened to the public as renovation continues. It is anticipated that renovating the entire facility will take several years.

DNR awarded a contract to build a public fishing lake in Dodge County at a cost of \$1.2 million. This 100-acre lake will be completed in fiscal 1991. Fisheries Management will have the lake ready for public fishing by July 1993.

Striped-Bass Activities. Native striped-bass populations have steadily declined in several areas of Georgia. The Fisheries Section has identified 29 thermal refuges on Georgia rivers which stripers are known or believed to use and has provided this information to DNR's Environmental Protection Division (EPD). The refuges are springs that maintain cool summer temperatures and help adult striped bass survive the warm water temperatures. EPD will help protect these refuges by placing restrictions on permits for water withdrawals.

The Department also studied the decline of the Savannah River striped-bass population and began exploring methods to reverse this trend. In fiscal year 1990, DNR signed a five-year contract with the University of Georgia's Cooperative Fisheries Unit to investigate the problem. The Department and the U.S. Fish and Wildlife Service produced, tagged and stocked into the Savannah River over 100,000 two-inch striped bass. Another 10,000 large fingerlings (six or more inches long) were tagged and stocked in fall 1990. The Cooperative Fisheries Unit will evaluate these stockings.

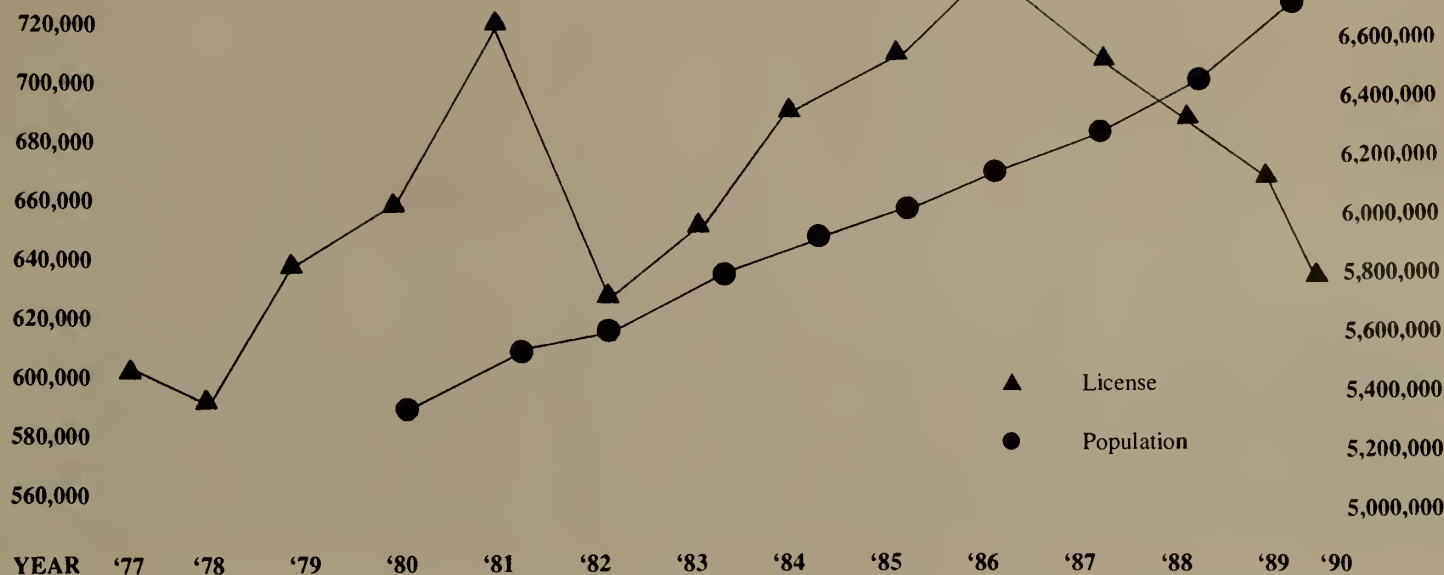
License Sales Trends. Despite a growing population in Georgia and DNR's efforts to meet public needs for recreational fishing, license sales have declined in recent years (Figure 1). This concerns DNR, and Fisheries Management will look into the possible causes, beginning in fiscal 1991. DNR has already created an aquatic education program which promotes children's fishing and increases public awareness of Georgia's aquatic resources. Research into the decline in license sales will help guide aquatic education and other programs to meet Georgia's needs.

Fish Stocking. DNR produced more than 5.3 million fish at its seven warmwater hatcheries, and stocked them into more than 2,800 private ponds. DNR continued to sample fish populations in Georgia's major reservoirs and streams, and completed two new public boat ramps, one on the Satilla River in Atkinson County

Fishing License Sales 1977-1990

Figure 1.

Resident Combination and Fishing License Sales



and another on the Little River in McDuffie County. During fiscal 1990, DNR raised and stocked about 800,000 catchable trout into trout streams, in addition to more than 360,000 catchable trout which the U.S. Fish and Wildlife Service raised. Georgia's popular reservoir fisheries for striped bass and hybrid striped bass received over 900,000 Atlantic-strain striped bass and over two million hybrids from stocking during fiscal 1990. The Section's research program also continued to identify management needs, assess fish populations, and evaluate ongoing programs state-wide.

LAW ENFORCEMENT

During fiscal 1990, the Department continued to improve the effectiveness and professional status of conservation rangers. These officers enforce laws regulating native game and nongame animals and fish, non-native animals, protected plants, boating safety, and mandatory hunter safety. They also support other law enforcement agencies on request. Hundreds of citizen volunteers assist the Section's activities. They include hunter-safety instructors and members of the U.S. Coast Guard Auxiliary and U.S. Power Squadron.

Training. All law enforcement officers received in-service training during fiscal 1990. This training is required to maintain law enforcement certification for the conservation officers.

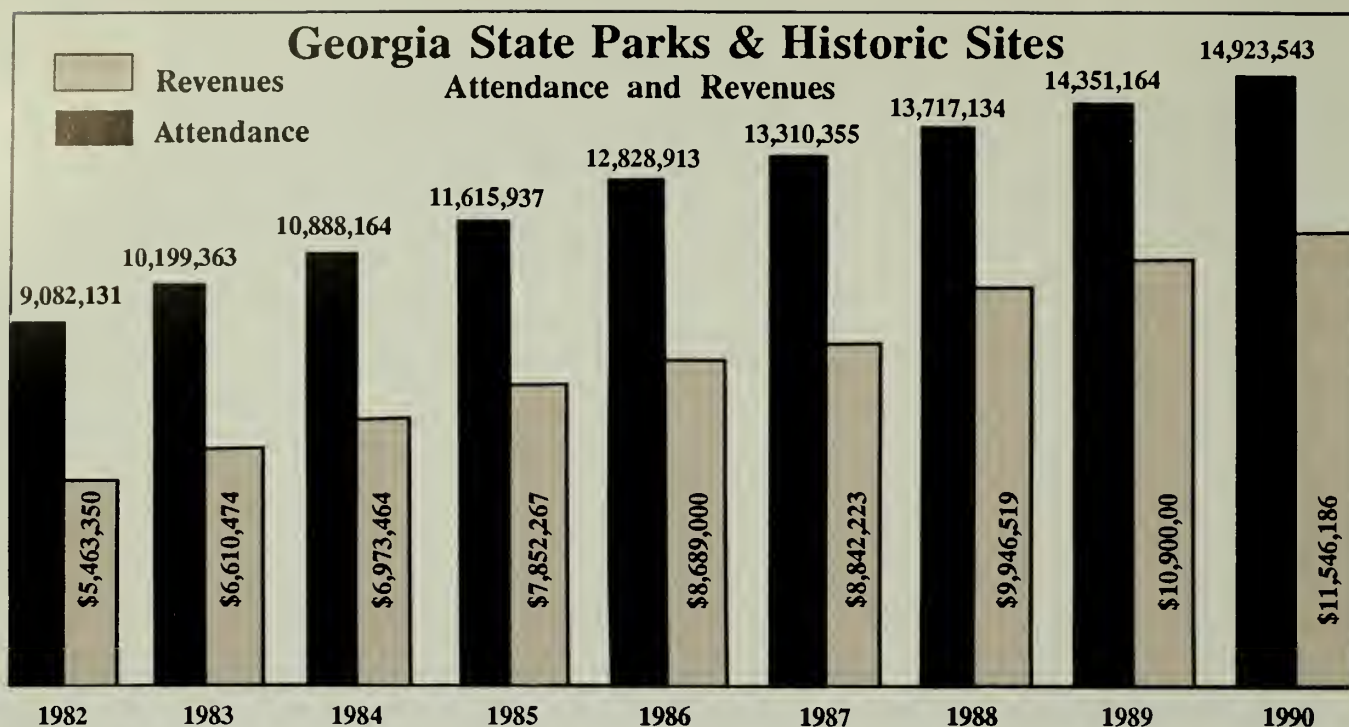
Emergency Operations Center. Law Enforcement staffs DNR's emergency operations center. The center has a toll-free telephone number and 24-hour communications with environmental specialists and conservation officers. These DNR employees respond to environmental emergencies and to reported violations of game, fish and boating laws. During fiscal 1990, DNR added four full-time radio operators to the center, to continue providing a prompt, professional response to citizen calls.



Boating Safety. DNR Law Enforcement continued its strict enforcement of Georgia's boating-under the influence-laws (BUI) Laws. An Increase in the number of BUI arrests in fiscal 1990 helped reduce the number of serious boating accidents during the year. Lake Lanier, a very high-use area, received one additional boating safety officer funded through federal appropriations. Several task force assignments addressed boating safety problems on specific waterways. Albany State College continued a research project to evaluate the effectiveness of Georgia's Boating Safety Program.

National Accreditation. DNR has applied for, and will be the third conservation agency in the nation to obtain, national accreditation for law enforcement officers through the Commission on Accreditation for Law Enforcement Agencies. Participation in the accreditation process will enable DNR to perform more effectively and will increase public respect for conservation law enforcement activities.

DNR applied for, and should soon receive, national accreditation for Game and Fish Law Enforcement officers.



State Parks and Historic Sites visitation has increased 64 percent between 1982 and 1990, while revenues have jumped by 111 percent.

Parks, Recreation and Historic Sites

As part of its pledge to preserve Georgia's exceptional natural beauty and cultural treasures for present and future generations, the Parks, Recreation and Historic Sites Division made substantial progress toward enhancing public awareness of, and appreciation for, these special resources during fiscal year 1990. As the Division continued upgrading all state parks and historic sites on a well defined schedule, record numbers of visitors enjoyed high quality facilities and participated in special programs reflecting Georgia's unique natural and cultural heritage. Operating 44 state parks and 14 historic sites on 61,382 acres of land, the Division also strived to ensure public access to quality outdoor recreation for decades to come.

State parks and historic sites played a major role in the state's economic development during the year, again making an outstanding contribution to Georgia's \$9 billion-per-year tourism industry. Visitation to Georgia state parks and historic sites has increased a total of 64 percent since 1982; 9,082,131 visitors were recorded in fiscal 1982, growing to 14,923,543 in fiscal 1990 (see Figure 1). During this eight-year period, revenues generated at these facilities more than doubled, increasing 111 percent from \$5,463,350 in 1982 to \$11,546,186 in 1990. While these figures indicate a positive growth trend, they also point to the heavy burden placed on these assets by the public. DNR's *Five-Year Strategy* calls for additional land acquisition and an increased emphasis on repair and maintenance of parks and historic sites. Priorities set during fiscal

year 1990 include:

- Operating, maintaining and protecting natural and cultural resources at a maximum level of efficiency.
- Increasing public awareness of the recreational, natural and cultural resources at state parks and historic sites.
- Administering an effective State Historic Preservation program.
- Participating in the efforts of the State Needs Assessment Committee to ensure that DNR priorities for lands, facilities and funding are considered.

GRANTS

The Division administered Federal Land and Water Conservation Fund grants totaling \$254,000 which were awarded to 12 local governments during fiscal 1990, and awarded a total of \$1,233,000 from the state's Recreation Assistance Fund to 121 community projects for development of local recreational facilities. Federal Historic Preservation Fund grants for 18 community surveying and planning projects totaling \$139,000 were administered by the Division. DNR also provided \$275,000 in state funds for regional preservation planning services at 13 of Georgia's 18 Regional Development Centers and \$125,000 for operation of the Recreation Technical Assistance Program, operated by the University of Georgia.



OPERATIONS

The Department operates and maintains 58 parks and historic sites, which include 319 cottages, 2,543 campsites, 1,800 historic markers, 23 museums, four regulation golf courses, five lodges and Roosevelt's Little White House. During fiscal 1990, the section assisted the five region offices and lodge facilities in budgeting, personnel, training, visitor services, concessions management and interpretive programs; and provided exhibit design and fabrication, historic marker maintenance and artifact preservation and repair.

Two new lodges were opened during fiscal 1990 — Red Top Mountain Lodge near Cartersville and Amicalola Falls Lodge near Dawsonville. These new facilities have completed a system of five state park lodges, and provide an alternative to campsites or cottages for overnight accommodations at state parks.

Outdoor recreation and interpretive programs were popular during the year and included over 8,000 special events, recreation programs, interpretive activities and exhibits. Music festivals, mountain rendezvous, living history demonstrations, wildflower programs, canoeing and backpacking trips and Indian heritage programs attracted over 450,000 participants.

MAINTENANCE AND CONSTRUCTION

The Maintenance and Construction Section carries out all major maintenance and construction activities, using the skills of craftsmen employed by DNR or the services of architects, engineers and contractors, to ensure a quality experience for visitors. Growing public usage, together with limited funds, has required more effective management of repair and maintenance projects. To meet this challenge, fiscal and project management systems were implemented during 1990 and a five-year capital outlay schedule for new construction and major maintenance was updated. The revised schedule will assist DNR in achieving its *Five-*



An aerial shot of beautiful Unicoi (top), near Helen, suggests why Georgia State Parks and Historic Sites draw larger numbers of visitors yearly. Below, young dancers at one of the many Indian cultural festivals sponsored by DNR.

Year goal of attaining quality standards at all state parks and historic sites.

Major construction projects completed during fiscal 1990, including new lodges at Red Top Mountain and Amicalola Falls State Parks, were milestones for the state. The \$7.8 million Amicalola Falls Lodge was the largest construction project undertaken by DNR in recent years. Lake Richard B. Russell State Park, constructed in cooperation with the U.S. Army Corps of Engineers, was opened during fiscal year 1990. Completion of a visitor's center and staff residence led to the opening of Picketts Mill Historic Site.

Several golf course projects were planned or finished during the year. A new 18-hole course, clubhouse and related facilities were completed at Georgia Veterans State Park. Renovation of the back nine holes at Hard Labor Creek State Park, including new tees, greens and fairway bunkers, was completed and work began on the renovation of the front nine holes. A new nine-hole

Table I. Park Improvements During Fiscal Year 1990

Amicalola Falls	Construction of 57-room lodge and meeting facilities with restaurant completed summer 1990 at a cost of \$7.8 million. Design of walk-in lodge for hikers completed spring 1990 at a cost of \$750,000.
Florence Marina	Construction of two new cottages completed spring 1990 at a cost of \$150,000.
Fort Mountain	Renovations to 15 cottages completed spring 1990 at a cost of \$240,000.
Georgia Veterans	Construction of 18-hole golf course, clubhouse, maintenance facility and cart storage barn completed summer 1990 at a cost of \$2.9 million.
Gordonia-Alatamaha	Construction of nine-hole golf course completed summer 1990 at a cost of \$660,000.
Hard Labor Creek	Renovations to golf course, at a cost of \$390,000, with back nine completed spring 1990. Construction of new group shelter completed spring 1990 at a cost of \$105,000.
Indian Springs	Improvements to day-use area, including walkways, paving, parking and rest station completed summer 1990 at a cost of \$500,000.
Panola Mountain	Expansion of visitors/interpretive center completed summer 1990 at a cost of \$190,000.
Picketts Mill	Construction of visitors center completed spring 1990 at a cost of \$540,000.
Red Top Mountain	Construction of 33-room lodge and meeting facilities with restaurant completed fall 1989 at a cost of \$3 million. Design of 18-hole golf course and facilities completed summer 1990 at a cost of \$190,000.
Watson Mill Bridge	Construction of visitors center began Summer 1990 at a cost of \$145,000.

course neared completion at Gordonia-Alatamaha State Park. This unique project features a golf course irrigation system that also serves as the City of Reidsville's wastewater treatment facility spray irrigation field. The maintenance facility and golf cart barn were constructed utilizing crews from the Georgia Department of Corrections. Also during fiscal 1990, plans and specifications were completed for a new 18-hole course at Red Top Mountain State Park and a new nine-hole course at Laura S. Walker State Park.

Other major projects were completed during fiscal year 1990 (see Table 1). Kitchen facilities were renovated at Unicoi Lodge Restaurant. New miniature golf courses were constructed at Florence Marina and Seminole State Park and tennis courts were built at Lake Walter F. George Lodge. The 1890's house at Jarrell Plantation was restored. Design was completed for a walk-in lodge at Amicalola Falls which will be accessible only via a five-mile hike, and will provide food and lodging for hikers. The facility was designed to minimize disruption to the environment and includes a self-contained utility center for water, electricity and propane gas.

DNR responded to a record number of repair projects caused by storms, fires and flooding during the year.

HISTORIC PRESERVATION

The Historic Preservation Section administers state and federal grants (see **Grants**) and provides a variety of information and technical services to federal, state, and local governments, local preservation and historical organizations, educational institutions and citizens. These services assist in protecting, preserving and utilizing Georgia's historical and archaeological resources. During fiscal year 1990, 53 Georgia nominations were accepted for listing in the National Register of Historic Places. Included were 22 historic districts and 31 individual properties. The state's Certified Local Governments increased also, jumping from 20 to 24 with the addition of Monticello, Columbus, Lexington and Tifton.

Toward helping DNR meet the goal of preserving and enhancing historical resources at state historic sites, Historic Preservation staff assisted with projects at the Lapham-Patterson House in Thomasville, the Hofwyl-Broadfield Plantation in Glynn County, the Dahlonaga Gold Museum and New Echota Historic Site near Calhoun. The State Archaeologist assisted many parks and historic sites, while advising DNR's Game and Fish Division concerning proposed improvements at state wildlife management areas.

DNR's Historic Preservation staff completed the second round of statewide surveys of historic structures during the year, as part of a revitalized Historic Resources Survey program. Ten new surveys were funded during fiscal year 1990, including three archaeological surveys and five countywide surveys. The survey program has resulted in an improved data base for preservation activities and coordinated planning requirements, and has made a significant contribution to public awareness of historic resources.

Historic Preservation worked closely with the Georgia Department of Community Affairs to develop information and technical assistance for the historic resources element of local comprehensive plans required by the **1989 Comprehensive Planning Act**. DNR developed a standard approach to data collection, prepared written information to advise Regional Development Centers (RDCs) and local governments, and provided training to the RDCs' historic preservation planners who are preparing the historic elements of the local plans.

DNR also joined the Georgia Department of Industry, Trade and Tourism on its Whistle Stop Train Tour of Georgia in May, 1990. Over 10,000 people toured the Historic Preservation Section's exhibit car to learn about the state's remarkable railroad heritage and the link between historic preservation and heritage tourism.

During fiscal year 1990, DNR established the Minority Historic Preservation Committee, an official committee of the Georgia National Register Review Board, to assist in and encourage an increasing statewide interest in preserving historic properties associated with Georgia's black heritage.

The second phase of the special project, "Georgia's Living Places — Historic Houses in Their Landscaped Settings", was begun in fiscal year 1990. Phase I (in 1989) included surveys of historic domestic architecture, gardens and landscapes. Phase II will follow up with preservation workshops, information packets and educational programs to assist property owners in preservation projects.

TECHNICAL SERVICES

The Division's budgeting, funding, marketing, personnel and long-range planning units provided administrative, informational and planning support during the fiscal year. The section administered the Federal Land and Water Conservation Fund; the Georgia Recreation Assistance Fund for local recreation facilities (see **Grants**); and DNR's funding of the Recreation Technical Assistance Program operated by the University of Georgia. Technical Services staff also supported the Governor's State Needs Assessment Committee, which issued recommendations on Georgia's parks, historic resources and natural areas and promoted legislation leading to formation of a Joint Senate/House Study Committee on Parks, Recreation, Historic Preservation and Natural Areas during fiscal year 1990. The Committee released their report in December 1990.

Technical Services staff continued implementing a comprehensive marketing and promotion plan for state parks, historic sites and lodges during the fiscal year. Public awareness was enhanced by the *Great Georgia*



Augusta's Springfield Baptist Church represents historic properties associated with Georgia's black heritage. DNR's Historic Preservation Section strived to promote public interest in these and other historic properties during the year.

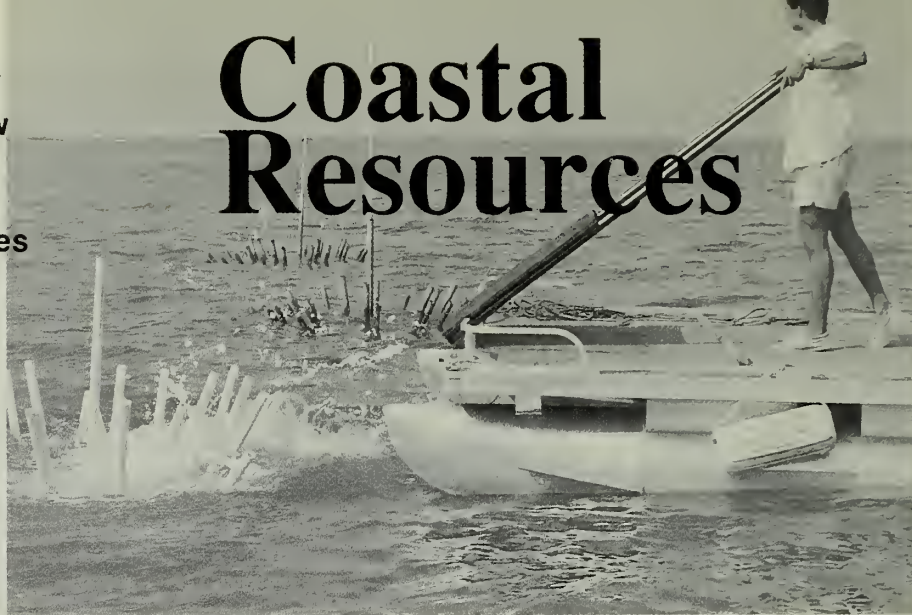
Getaways logo theme on collateral and advertising. Potential visitors' access to information about Georgia was bolstered by promotion of DNR's toll-free information phone lines. Through advertising, publicity, travel/trade shows and direct mail campaigns the state park lodge system was effectively marketed. A group sales effort for lodges was begun, with existing personnel. A new ad promoting state park golf courses was designed and placed in several state and regional golf publications. Special promotions included an insert in *Georgia On My Mind* magazine, the official travel guide for Georgia; participation in the Georgia Department of Industry, Trade and Tourism's "Stay and See Georgia" shows in Atlanta and Macon; and a direct mail campaign to the motorcoach tour industry, utilizing Little White House Landmark Tins.



This map depicts Georgia's 100-mile coast, and its barrier islands.

The region's 475,000 acres of saltmarshes and relatively unspoiled beaches nourish an astonishing variety of marine life; the area also supports a thriving tourism industry, as well as lucrative commercial fisheries.

Coastal Resources



The 475,000 acres of saltmarsh along Georgia's 100-mile coastline nourish an astonishing variety of life, including valuable fish, shrimp and shellfish. In addition to providing commercial fishermen with approximately \$22 million in annual catches, Georgia's coastline attracts millions of visitors who contribute more than \$1 billion to the state's economy each year. As Georgia's population continues to grow, protection of valuable marine resources is becoming increasingly important.

During the past fiscal year, DNR's Coastal Resources Division (CRD) made substantial progress toward meeting goals framed under the *Five-Year Strategy* to protect Georgia's marshes, beaches and sandsharing systems, improve opportunities for commercial and recreational marine fishermen and expand research and protection efforts for threatened and endangered marine species. Specific goals framed under the *Five-Year Strategy* during fiscal 1990 were:

- **Implementation of Georgia's coastal waterbottoms leasing program;**
- **Maintaining the biological productivity of marine fishery resources to meet the needs of Georgia's growing coastal population;**
- **Improving research, management and protection efforts for threatened and endangered marine species;**
- **Providing technical advice to coastal communities suffering from beach erosion.**

During the fiscal year, construction continued on the new coastal regional headquarters complex in Brunswick. Completed in fall 1990, this facility was built to house all Coastal Resources Division staff and other DNR regional personnel.

The threat of Hurricane "Hugo" in September 1989 necessitated the evacuation of all low-lying offices, as well as personnel and families on Sapelo and Ossabaw Islands. Fortunately, the Georgia coast was spared the brunt of the storm, suffering no more serious damage than a few fallen limbs and power outages. Hugo's threat did, however, give Coastal Resources Division staff an opportunity to test their evacuation plan and make necessary adjustments in the event that another storm of Hugo's caliber threatens the coastal area.

MARSH AND BEACH SECTION

Georgia's relatively undeveloped shorelines and marshes are both delicate ecosystems, particularly susceptible to the influence of human activities. To preserve the coast and its many valuable resources, DNR operates a strong marsh and beach protection program which includes reviews of proposed developments and alterations to the coastal marshes and beach areas. In the past few years, Marsh and Beach Section personnel have worked closely with area officials to enhance the sandsharing system through renourishment projects on several beaches, including Tybee and Sea Islands.

Beach Renourishment. In April 1990, a privately funded, DNR-permitted beach renourishment project was completed on Sea Island. Nearly two million cubic yards of sand was pumped onto the beach from intertidal and subtidal borrow pits in the Hampton River. Prior to the project, the dry sand beach had completely disappeared. The renourishment project created a beach approximately 200 feet wide with an elevation of 12 feet. Dune stabilization measures have also been taken to prolong the life of this project.

Continued erosion of developed beaches in Glynn County has generated concern among local government, shoreline property owners and the coastal tourism industry. Georgia's "Golden Isles" beaches — Jekyll, St. Simons and Sea Islands — make up approximately 15 miles of the Georgia coastline, but in the past 25 years erosion has begun to threaten many of the condominiums, hotels and other structures originally built more than 400 feet from the ocean. Public beach access and recreation has also been threatened in many areas as erosion has gradually removed the high tide beach.

During fiscal year 1990, CRD staff worked closely with Golden Isles officials to explore renourishment alternatives for the eroded shoreline. With the production of a question-and-answer brochure on renourishment for citizens and businesses and a brochure on dune preservation for distribution to area hotels, it is hoped that public awareness of this problem and support for renourishment efforts can be increased.

Waterbottoms Leasing Program. During fiscal year 1990, DNR's Real Estate Unit and the Marsh and Beach Section took steps towards implementation of

the waterbottoms leasing program. During its 1989 session, the Georgia General Assembly granted DNR the authority to lease coastal waterbottoms for marina development. Since this time, several new marinas have been issued waterbottom leases, and several existing marinas have been issued grandfathered leases. Processing of lease applications will continue on an ongoing basis.

During the fiscal year, the **Coastal Marshlands Protection and Shore Assistance Committees** continued to review proposed coastal developments and exercise authority to grant, suspend, revoke or deny permits for development that would alter the coast's marshes or beaches. DNR's Marsh and Beach Section serves as the staff for both committees.

COASTAL FISHERIES

During fiscal year 1990, Coastal Fisheries made major strides toward meeting goals to enhance recreational fishing on the coast and improve management of Georgia's commercial fisheries. The four programs carried out by the Coastal Fisheries Section include Recreational Fisheries, Commercial Fisheries, Outer Continental Shelf and Shellfish.

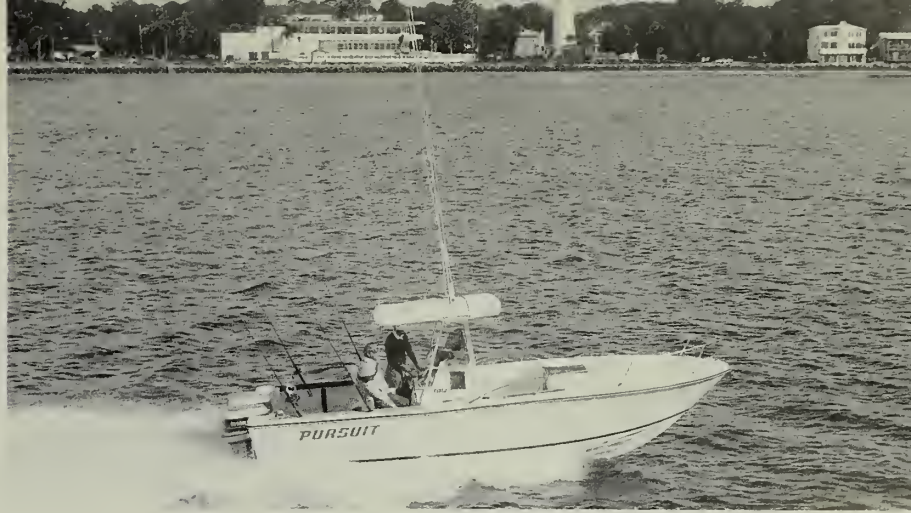
Coastal Fishing Improvements. One of the primary accomplishments during the fiscal year was the implementation of season, size and creel limits for 17 species of marine sportfish. Effective October 1, 1989, these regulations are designed to protect some of Georgia's more popular sportfish, including spotted seatrout, red drum, billfish, snapper, grouper and mackerels, from overfishing.

After almost three years of negotiations with various user groups, the recreational fisheries program received a permit to construct five near-shore artificial reefs off the Georgia coast. Designed to improve fishing opportunities in near shore waters, the reefs will be placed five to seven miles from land in areas that are readily accessible to fishermen. Construction of the first reef, located off Tybee Island near Savannah, is scheduled for fiscal year 1991.

In September 1989, the recreational fisheries program was issued a permit to construct an inshore artificial reef in Jove Creek, Glynn County. This reef is the last of four experimental inshore reefs constructed in the coastal area since 1987. All the inshore reefs were constructed of Fish Aggregating Devices (FADs). Placed in clusters of four, the FADs quickly become encrusted with oysters and barnacles and provide excellent fishing for popular inshore sportfish, such as spotted seatrout and sheepshead. A study is currently underway to determine if such reefs can improve sportfishing in other locations.

Georgia's eight artificial reefs have experienced continued heavy fishing and scuba diving activity. Fishing success on these structures has been excellent and expansion of these reefs is planned. To help assure continued fishing success on these structures, Outer Continental Shelf program personnel are currently developing a management plan for all Georgia's artificial reefs.

DNR's Coastal Resources Division proudly premiered its newest film, titled "Underwater Oases: Georgia's Artificial Reefs" on Jekyll Island and in Savannah in



August 1989. Produced by the DNR Film and Video Unit, this documentary highlights artificial reef developments in Georgia and explains the ongoing efforts of the outer continental shelf and recreational fisheries staff. The video has been popular with coastal fishermen and other outdoor enthusiasts.

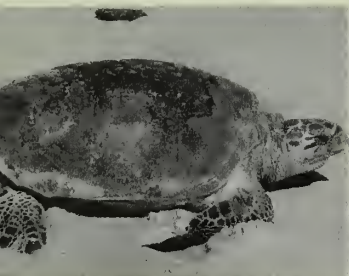
Throughout the year, Recreational Fisheries Program personnel have continued a study of juvenile and adult red drum. Samplings over the past three decades show that the number of adult red drum in Georgia's coastal waters has declined due to severe winters and increased fishing pressure. Data are being gathered to evaluate the status of remaining red drum stocks and to assess the effectiveness of regulations in preventing overfishing.

Shrimping. Despite high volumes of catches during the 1989 shrimp season, Georgia's shrimp industry continued to suffer economically as a result of low unit prices. To help offset this problem, the Coastal Fisheries Advisory Commission recommended a conditional opening of Georgia's sounds. In early November, Wassaw, Ossabaw, Sapelo, St. Simons, St. Andrews and Cumberland Sounds were opened to commercial shrimp trawling for three days. Overflights on opening morning revealed 493, or approximately 87 percent of all licensed operators, working in the sounds. Commercial shrimpers caught \$1.4 million worth of shrimp during the three-day opening.

Following record low temperatures that decimated Georgia's white shrimp population during Christmas week, commercial fisheries program staff began the new year assessing the damage and developing management strategies to address this crisis. Results of the samplings prompted the Commissioner to rescind a previous recommendation to extend shrimping season into January and to close inshore bait zones to commercial and sport bait shrimping.

On March 23, Governor Joe Frank Harris requested that the U.S. Small Business Administration approve a disaster declaration for Georgia's six coastal counties to enable the commercial fishing industry and related businesses to receive essential economic relief. To further protect surviving white shrimp during the spring spawning season, DNR and South Carolina's Wildlife and Marine Resources Department jointly requested an emergency closure of federal waters to shrimp trawling. The request was approved and on April 3, 1990 the Exclusive Economic Zone (EEZ) was closed to all commercial shrimping.

DNR continues to improve coastal sport fishing opportunities for Georgians. Fish Aggregating Devices, or FADs (opposite), are used to construct inshore artificial reefs. These draw popular inshore fish like spotted seatrout.



Sea turtle nesting surveys were an important part of DNR's efforts to restore populations of threatened or endangered coastal species during the year. Sea turtles that may be found in Georgia waters include the threatened loggerhead (top); and endangered hawksbill.

The emergency rule was lifted on June 1 when South Carolina's commercial shrimping season and Georgia's bait zones were opened. Georgia waters were reopened to commercial food shrimping on June 11, 1990. An overflight of coastal beaches on opening day revealed 277 boats trawling. As expected, opening day catches were very light due to white shrimp populations being only 48 percent of normal and the timing of the season opening being too early for brown shrimp catches which normally peak in July.

A study of Georgia's **castnet fishery** was implemented during the fiscal year as a result of increasing conflicts and perceived competition between various shrimp resource user groups. Estimates of participation and harvest as well as general information about the time and effort exerted by recreational castnetters was provided. The study showed that the average castnetter made approximately eight trips in 1989 and spent about two hours casting. Approximately 7.9 pounds of shrimp were caught per trip.

Whelks. As a result of the closure of beaches to commercial food shrimping and a growing interest in whelk and crab trawling, Georgia's offshore waters were opened to crab/whelk trawling on January 17, allowing otherwise dormant trawlers an opportunity to work. This trawl fishery, which was virtually non-existent prior to 1980, has grown to an average annual directed harvest of 1,179,384 lbs. of meat valued at \$189,678.

Blue crab. In July 1989, DNR began a one-year study to assess environmental factors associated with fluctuations in commercial blue crab harvest. The study, supported by state and federal funds, investigated the statistical relationship between an index of stock density and a variety of natural factors, including regional and local river discharges, rainfall, estuarine salinities and estuarine temperatures. Initial analyses of blue crab landings have revealed a pronounced shift in the market structure of the blue crab fishery from a predominately processed product (picked crab) industry to an increasingly live crab export industry.

Shellfish. Georgia's shellfish program was again named one of the best in the nation by the U.S. Food and Drug Administration. DNR Shellfish Program staff are responsible for monitoring water quality in approved harvest areas to make sure they meet National Shellfish Sanitation Program guidelines.

In April, DNR's Coastal Resources Division accepted delivery of a new all-aluminum transport vessel named the *R.V. Oyster Catcher*. Purchased with settlement funds from the 1986 Amazon Venture oil spill in the Savannah River, the new barge was specially designed for use in Georgia's inshore estuarine waters. Powered by twin 150-hp outboard motors, the *R.V. Oyster Catcher* will be used primarily to enhance Georgia's public recreational harvest areas. Shellfish Program personnel will also use the vessel to experiment with modern harvest methods to help promote growth and development of the state's shellfish industry.

Atlantic and shortnose sturgeon. In March, the DNR and U.S. Fish and Wildlife Service began work on a project to help restore populations of Atlantic sturgeon and endangered shortnose sturgeon in Georgia's coastal waters. In addition to collecting broodstock for spawning, CRD biologists implanted several Atlantic and shortnose sturgeon with radio and ultrasonic transmitters to further determine the movement and migration of these species.

Coastal Endangered Species. During the year, Coastal Resources Division personnel worked diligently to maintain and restore populations of threatened and endangered species in coastal Georgia. In cooperation with the Game and Fish Division, the St. Catherines Island Foundation and Little St. Simons Island personnel, CRD staff established **sea turtle** nest surveys and nest protection programs on Ossabaw, St. Catherines and Sapelo Islands. Approximately 750 loggerhead sea turtle nests were laid on Georgia's beaches during the 1989 nesting season. (Figure 2 depicts loggerhead turtle nests on Ossabaw Island since 1981).

In late August 1989, a U.S. District Court judge ordered the Secretary of Commerce to implement regulations to protect endangered and threatened sea turtles. Specific 105-minute trawl time restrictions were imposed on shrimpers in the South Atlantic and Gulf of Mexico. Effective Sept. 8, the original requirements mandating Turtle Excluder Devices (TED), in trawl nets in the southeast were reinstated. The U.S. Coast Guard reported good overall compliance by Georgia shrimpers.

DNR continued its aerial manatee survey to identify important habitats and travel routes of endangered **manatees**. CRD personnel also worked closely with EPD and U.S. Fish and Wildlife Service personnel as they constructed a warm water basin for overwintering manatees at the Gilman Paper Co. effluent discharge site in Camden County, near St. Marys.

With possibly less than 300 **right whales** left in existence in the northern Atlantic, the probability of encountering one of these rare mammals is low. Incidental sightings of these endangered animals provide important information on their movement and migration. During the winter of 1989-1990, 19 sightings of 35 whales were reported to DNR's Coastal Resources Division. The crew of the *R.V. George T. Bagby* reported four sightings of 12 right whales, including eight individuals seen in two groups on January 19, 1990. Film and video taken by DNR staff was forwarded to the New England Aquarium for identification of individuals by analysis of callosity patterns on the whales' heads. These records can provide information on survival and calving intervals.

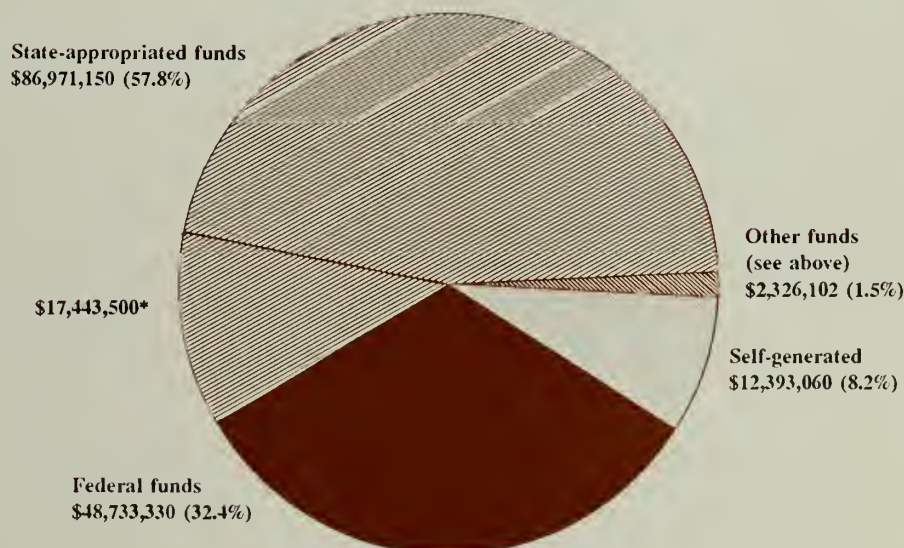
Department of Natural Resources Expenditures and Funding Sources, Fiscal Year 1990

	Internal Administration	Parks, Recreation & Historic Sites	Coastal Resources	Game & Fish	Environmental Protection	Total Dept.
EXPENDITURES						
Positions	89	519	36	504	354	1,502
Personal Services	\$3,895,608	16,496,948	1,533,966	20,611,373	18,626,786	61,164,681
Operating Expenses	2,020,566	10,270,101	593,728	7,050,159	5,694,673	25,629,227
Capital Outlay	6,246,252	7,600,558	256,265	3,805,189		17,908,264
Contract Payments	2,403,663	1,447,311			435,000	4,285,974
Federal Grants		745,102			31,097,178	31,842,280
State Grants		1,683,300			7,667,750	9,351,050
Nongame Conservation	207,605	4,268	2,134	28,157		242,164
TOTAL	\$14,773,694	38,247,588	2,386,093	31,494,878	63,521,387	150,423,640
FUND SOURCES						
State Funds	\$13,771,495	24,819,534	1,745,900	23,527,646	23,106,579	86,971,154
Federal Funds	23,757	1,379,816	498,601	7,080,500	39,750,655	48,733,329
Self-Generated Funds		11,825,590		491,721	75,744	12,393,055*
Other Funds	978,442	222,648	141,592	395,011	588,409	2,326,102**
TOTAL FUND SOURCES	\$14,773,694	38,247,588	2,386,093	31,494,878	63,521,387	150,423,640

*(Self-generated funds included \$11,546,406, park fee collections; \$548,009, timber sales; \$2,604, McIntosh County transportation; \$33,158, Sapelo Island boat fares; \$10,424, Sapelo Island mail delivery, U.S. Postal Svc.; \$5,000, Ossabaw Island rent; \$75,744, Environmental Protection Division map sales; and \$171,710, Duck print and stamp sales.)

**Other funds: \$629,594 (Jekyll Island/Stone Mountain payback requirement); \$242,154 (Nongame Wildlife Fund contributions); \$80,087 (insurance reimbursements); \$176,066 (Amazon Venture oil spill settlement funds); \$299,463 (state agency, outside contracts); \$27,122 (general obligation bond fund transfer); \$267,198 (donations); \$154,305 (Office of Energy Resources); \$91,700 (miscellaneous sales, proceeds from interpretive programs, forfeited checks, etc.); \$358,413 (Georgia Underground Storage Tank fund).

Breakdown of Fund Sources, Fiscal Year 1990



*\$17,443,500 of the state appropriation was derived from sales of hunting and fishing licenses and permits and recreational/commercial boating fees; asbestos removal license fees; water well drilling permits; fines; and miscellaneous permits, etc.

For more information
on programs to enhance
and protect Georgia's
natural and environmental
resources, call or write:

The Georgia Department of Natural Resources
205 Butler St. S. E., Suite 1258 East
Atlanta, Ga. 30334
(404)656-0772

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